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THE LIFE-WORK OF DR. E. K. MUSPRATT.

My Life and Work. By Dr. E. K. Muspratt. Pp. xi+320. (London: John Lane, 1917.) Price 7*s.* 6*d.* net.

THE author of this autobiography comes of a family which has exercised a marked influence on the industrial development of South Lancashire. Its members, moreover, have played no inconsiderable part in the social and intellectual life of Liverpool. To his father, James Muspratt, belongs the credit of founding the alkali manufacture in Lancashire. His life is one of the romances of chemical industry. Born in Dublin, of English parents, in 1793, he was apprenticed, when fourteen years of age, to a wholesale druggist in that city, but losing both his parents when he was scarcely eighteen, he broke his indentures and embarked for Spain in the hope of obtaining a cornetcy in a cavalry regiment in Wellington's army. A youth of fine physique and of a splendid constitution, Muspratt had all the physical qualifications for a successful soldier, but unfortunately he had no social influence, and in those days commissions in mounted regiments were reserved for those favoured in high quarters. Still, he had some experience of the Peninsular campaign, was stricken with fever in Madrid, and was in Hill's retreat down the valley of the Tagus. He then joined the Navy, and as a midshipman in the *Impetueux* took part in the blockade of Brest and in one or two frigate actions. He soon threw up this career, and making his way back to Dublin, started chemical manufacturing with the aid of a small inheritance which had been saved from the results of a Chancery action.

On the abolition of the salt duty in 1823, Muspratt saw his opportunity, and, moving to Liverpool, established, in the face of difficulties that would have crushed a weaker man, the manufacture of soda by the Leblanc process. He rapidly acquired wealth, and eventually built Seaforth Hall, a fine large house in the classical style, and a prominent landmark in what was then a remote suburban district among the sandhills at the mouth of the Mersey. He died at the age of ninety-three, after a vigorous, active life, full of excitement and incident. He had a large family, one of whom, Dr. Sheridan Muspratt, the well-known editor of the "Dictionary of Chemistry," a work which had a considerable vogue in its day, founded the Liverpool College of Chemistry.

The author of this memoir was the youngest son of the father of the alkali trade. He was born in 1833—the same year as his friend, the late Sir Henry Roscoe, with whom he went to school at Gateacre. When young Muspratt was about four years old the British Association happened to meet at Liverpool, an event which was destined to have a considerable influence on his after-life. Among the distinguished foreign visitors was Justus Liebig, the chemist, then a comparatively young man of thirty-five, but already almost at the summit of his fame. With him the elder Muspratt, now an acknowledged leader of English chemical technology, and a man of social influence in Liverpool, contracted a firm friendship which eventually included both their families.

After a good school training on Pestalozzi's system young Muspratt was sent in his seventeenth year to Giessen to study chemistry under Liebig and Will, and physics and mathematics under Buff and Zamminer. "When I first arrived at Giessen," writes our author, "Liebig, who was only about fifty or fifty-one years of age, appeared an old and broken-down man. When he entered the lecture-room he could hardly walk firmly, but glided in and appeared exhausted with the effort. In a few minutes all was changed, when he became inspired by the subject of his lecture."

Liebig, shortly afterwards, was invited to a far less strenuous position in the University of Munich, a circumstance which, no doubt, prolonged his life, and Dr. Muspratt elected to follow him, not so much with the view of studying chemistry as of studying medicine, to which at that time he had some inclination. He and the other members of his family who from time to time joined him at Munich were now on terms of close intimacy with the Liebigs, and were, in fact, part of their social and home life. This section of Dr. Muspratt's reminiscences constitutes, indeed, one of the most interesting features of his book, and in a few graphic touches, done with the artlessness which conceals art, we gain a vivid impression of German university life and of the condition of German society in the early fifties of last century. It is not without its lights and shades. Nothing could be more striking, for example, than the contrast between the drab and humdrum life at Giessen, its atmosphere of strenuous study, its simple, homely pleasures, and the social whirl and political excitements of the gay and light-hearted Bavarian capital. We trace the influences already at work of which we see the outcome in this later time. The "foreigners," as the North Germans, who had been invited to Munich by Maximilian, at the instigation of his Prussian tutor, von Dönniges, were called, were never really popular in the city of their adoption. Their influence from the outset was, and with good cause, dreaded by the Ultramontanes, and there can be little doubt that it was used to promote Bavaria's adhesion to the North German Confederation, and, ultimately, to bring about its absorption into the German Empire. The potential political value of professors, of which we hear so much to-day, is no new thing in Germany.

The space at our disposal, unfortunately, does not permit us to follow Dr. Muspratt at greater length through the many episodes of his long and varied career. But before we leave his account of his Munich life it may be of interest to note it was the circumstance that his sister, Miss Emma Muspratt, afterwards Mrs. Harley, was attacked

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with typhoid fever when on a visit to the Liebigs that indirectly led to the invention of the world-famous "extract of meat."

The growing anxieties of a large and complex business at length compelled Dr. Muspratt to leave Germany in order to assist his father, and henceforth most of his life and energies were spent in his native city and its neighbourhood, varied only by not infrequent interludes of foreign travel, accounts of which form a considerable portion of his narrative.

But in spite of the constant demands upon his time and activities, owing to the changing and progressive character of manufacturing chemistry during the last few decades, Dr. Muspratt has found abundant opportunity to associate himself with the social, political, municipal, and intellectual development of Liverpool, and there have been few public movements of any importance in that city with which he has not been connected in greater or less measure. All this he sets out, with a pardonable pride, in this autobiographical record. His has been a singularly full, active, and useful life, of many and varied interests, fruitful in achievement and in unselfish personal service. The book is written in a simple, unaffected manner, with no pretensions to literary style. It has suffered in a very slight degree from the fact that the author's failing eyesight compelled him to seek the aid of an amanuensis. This doubtless accounts for the occasional misspelling of proper names and certain lapses in expression which ought not to have escaped the attention of the proof-reader. T. E. THORPE.

STUDIES OF THE RESPIRATORY EXCHANGE.

The Respiratory Exchange of Animals and Man. By Dr. A. Krogh. Pp. viii+173. (London: Longmans, Green and Co., 1916.) Price 6*s.* net.

THE fact that Dr. August Krogh is perhaps better known in this country than any other foreign contemporary physiologist is chiefly owing to the attention which was attracted by his researches on the mechanism of the respiratory exchange. A treatment of the subject from this point of view might have been expected of one whose own work has been of such fundamental importance in this direction; such expectation is, however, not realised in the volume before us, for it contains no reference to this department of the author's labours.

The study of the respiratory exchange has now grown to be a large subject divisible into subsidiary branches, and the monograph deals only with a limited aspect of one of these, namely, the quantitative aspect of the material and energy exchanges of the body as judged by the criterion of the total respiratory exchanges. The influences of functional activity are not considered.

The work opens with a short, clear account of the significance of the respiratory exchanges, and of the principles involved in direct and indirect calorimetry. The methods used in the investigation of the respiratory exchanges are described, and then follows the chief subject-matter of the volume. Great stress is laid throughout on the importance of referring all determinations of total respiratory exchange to a "standard metabolism," *i.e.* the metabolism of the organism when in a state of minimal functional activity, and the author ruthlessly sets aside the results of many admittedly interesting series of observations where this essential has not been observed.

The influences of various intrinsic factors and of chemical and physical factors are discussed, and then follows one of the most interesting chapters in the book, that on the variations in standard metabolism during the life-cycle. The sections of this chapter which deal with hibernation and that treating of the pupal life of insects are of first importance.

Some of the author's own work in this direction is highly interesting; for instance, he shows that by raising the temperature the duration of pupal life may be shortened even by two-thirds, yet in all cases the carbon dioxide produced during pupal life by unit weight of chrysalides is the same. The most diverse forms of animal life, from sea-urchin eggs to brooding pythons, are introduced to illustrate specific points, or to indicate useful lines for future work, the outlook being essentially biological.

The final chapter, which deals with the respiratory exchange in different animals of the same and of different species, shows careful treatment of results which are still very far from complete; the portion dealing with the relation of metabolism to surface and weight is logically dealt with. The bibliography is carefully chosen so as to present the pith of the very voluminous literature on the subject.

GNOMONICS AND CELESTIAL MOVEMENTS.

(1) *Gnomonica: L'Orologio Solare a Tempo Vero nella sua Moderna Applicazione.* By G. Bottino Barzizza. Pp. viii+199. (Milano: Ulrico Hoepli, 1915.) Price 2.50 lire.

(2) *Lezioni di Cosmografia.* By Prof. Giovanni Boccardi. Pp. x+233. (Milano: Ulrico Hoepli, 1916.) Price 3 lire.

(1) THIS is a short text-book on gnomonics, and is not intended for people who merely want to put up a nice sun-dial as an ornament in their garden or grounds. There is not a single picture of an article of that kind: only geometrical diagrams. The aim of the author is a much higher one, and has been well accomplished by showing how in careful hands a sun-dial may be used to control a clock sufficiently well for ordinary purposes. After explaining the diurnal and annual motion of the sun, the necessary formulæ are developed for tracing the hour-lines on horizontal and vertical dials and for correcting their indications for errors of adjustment. Convenient auxiliary tables are also given of the various

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